

ABSTRACT OF THE DISCLOSUREEMBEDDING DATA IN MATERIAL

A spatial domain image I produced by a source 1 is combined with watermark data R_i to produce a spatial domain watermarked image I'. The watermarked image is produced by an embedder 3 according to the equation

$$C_i' = C_i + \alpha \cdot R_i$$

where C_i and C_i' are wavelet transform coefficients of the image, and α is a scaling factor. α is chosen so that the watermark is imperceptible in the image and to resist removal of the watermark by unauthorised processing. It is desirable that α has the smallest value which achieves that. If α is too big the watermark is perceptible in the image; if it is too small the mark may not survive processing of the image.

α is determined from a trial decoding of the image I in a decoder 4. The decoding is that which would be used to decode the watermarked image I'. A value α' is produced by a calculator S3-S8, to which an offset value is added by an adder S9 to produce α . This produces values of α over the image, which are used to scale the data R_i so as to conceal the data. An image is one example of material to which the invention is applicable.

The step of producing modified coefficient values C_i may not use coefficients of magnitude greater than a threshold T and does not use corresponding information symbols R_i . Alternatively, a threshold T_{clip} may be set. The scaling factor α is calculated using clipped coefficient values and coefficients C_i of magnitude less than T_{clip} .

[Figure 1]